CAI-2003-22

UNITED STATES
DEPARTMENT OF LABOR
MINE SAFETY AND HEALTH ADMINISTRATION

COAL MINE SAFETY AND HEALTH
REPORT OF INVESTIGATION

Underground Mine

Fatal Roof Fall Accident
August 20, 2003

Alliance Coal LLC
Lexington, Kentucky

At

Cardinal Mine
Warrior Coal, LLC
Manitou, Hopkins County, Kentucky
I.D. No. 15-17216

Accident Investigators

Curtis W. Haile
Accident Investigator

Abe De Leon Jr.
Coal Mine Health & Safety Inspector

Joe Zelanko and Paul Tyrna
Pittsburgh Technical Support Specialists

Originating Office
Mine Safety and Health Administration
District 10
100 YMCA Drive, Madisonville Kentucky 42431-9019
Carl E. Boone II, District Manager

Release Date: October 14, 2003

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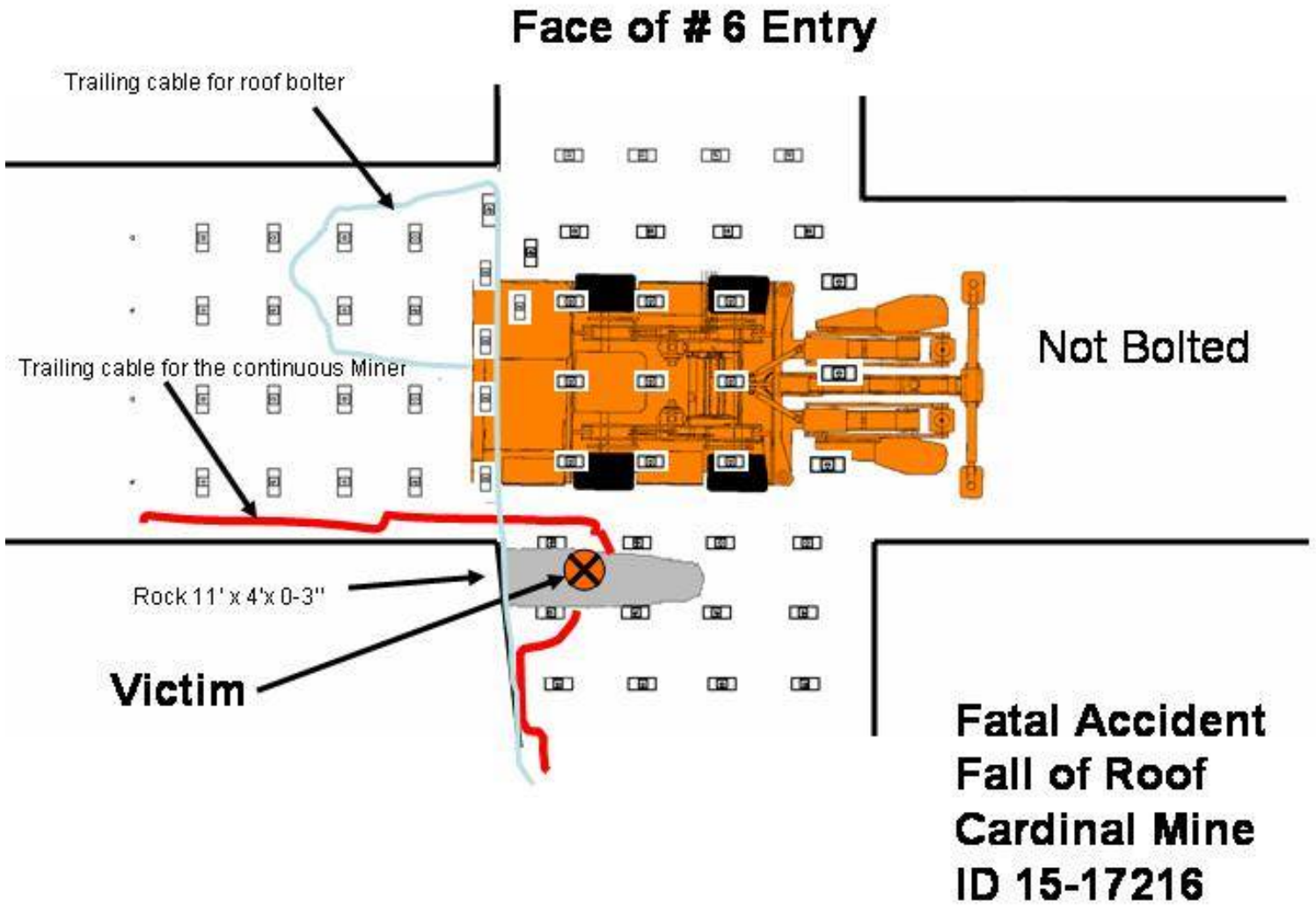

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OVERVIEW

At 1:45 p.m. on Wednesday, August 20, 2003, Unit Foreman William Adams, age 52, was fatally injured at Warrior Coal, LLC's Cardinal underground mine. Adams had nine years of experience as a unit foreman at this mine.

The accident occurred while Adams was helping relocate the trailing cable for the right side continuous mining machine to the opposite side of the No. 6 entry. As Adams bent over to pick up the miner cable, a rock measuring 11 feet long by 4 feet wide by 0 to 3 inches thick fell from between two rows of roof bolts. The rock struck Adams, forcing him face down to the mine floor resulting in his death.

The direct cause of the accident was rock falling from between the rows of permanent roof support. The falling material consisted of several pieces that were estimated to weigh a combined total of 1,600 pounds. The fall cavity was bounded by several steeply angled slickensides and intersected on the inby side by a tight, vertical joint. Bolt spacing adjacent to the fall was within roof control plan specifications.

GENERAL INFORMATION

The Cardinal mine, I.D. 15-17216, is located 3.10 miles southwest of Manitou, Kentucky off U.S. Highway 41. This underground coal mine began operation as Cardinal #2 Mine under the ownership of Robert Bros. Coal Co. Inc. on March 9, 1993. On February 16, 2001, the mine was acquired by Alliance Coal and a Legal Identity was revised to identify the company as Warrior Coal, LLC Cardinal Mine.

The Cardinal mine is opened into the Kentucky No. 11 Coal Seam and currently employs 220 persons with an underground employment of 168 miners. Continuous mining machines extract coal on three mechanized mining units on two 9-hour production shifts and one maintenance shift daily by the room and pillar method. Shuttle cars are used to transport coal from the working face to a conveyor belt which transfers the coal on to a surface overland belt for conveyance to a surface preparation facility. The processed coal is shipped by rail to Louisville Gas and Electric (LG&E) and the Paradise TVA power generating facilities located in western Kentucky.

The principal officers at the Cardinal Mine at the time of the accident were:

William C. Adelman	General Manager
Frank Daugherty	Operations Manager

The last Regular Safety and Health Inspection (AAA) was completed at the Cardinal Mine by the Mine Safety and Health Administration (MSHA) on June 25, 2003. An AAA inspection was ongoing at the time of the accident.

DESCRIPTION OF ACCIDENT

William Adams, victim and the No. 2 Unit foreman, entered the mine with his crew at 7:00 a.m. and arrived on the No. 2 Unit around 7:20 a.m. Soon after arriving on the section, Adams discussed a previous lost time injury that occurred at the mine and stressed roof control safety to the miners during a safety talk.

Production then began at 7:30 a.m. and the shift proceeded normally. At approximately 1:40 p.m., the continuous mining machine finished extracting coal from the crosscut to the right of the No. 6 entry. The machine was moved to the second crosscut outby the face in preparation of cutting the face of the No. 6 entry. At 1:45 p.m., Unit Helper Richard Burden lifted a section of the continuous mining machine trailing cable and waited for Adams to help pull the cable to the opposite side of the entry. When Adams bent over to pick up the cable, several pieces of immediate roof fell from between permanent supports. The falling material struck both Adams and Burden and measured 11 feet by 4 feet by 0 to 3 inches thick. Burden was hit with a glancing blow from the rock, knocking him away from the remaining falling material. Adams was forced to the mine floor by the rock and was fatally injured.

INVESTIGATION OF THE ACCIDENT

At 2:00 p.m., on Wednesday, August 20, 2003, Safety Assistant Kevin Vaughn notified MSHA Field Office Supervisor James H. Hackney at the District 10 Headquarters in Madisonville, Kentucky that an accident had occurred on the No. 2 Unit. Assistant District Manager Richard Reynolds and Staff Assistant Ted Smith dispatched an investigation team and then contacted MSHA Headquarters in Arlington Virginia, the MSHA Pittsburgh Safety and Health Technology Center and the Office of the Solicitor in Nashville, Tennessee.

The investigation team, consisting of MSHA Accident Investigator Curtis Haile, Roof Control Specialist Terry Cullen and Inspector Abe De Leon, arrived at the mine and issued an Order pursuant to 103(k) of the Act. The team interviewed witnesses during a pre-investigation conference at the mine office, and gathered documents and other relevant information.

The MSHA investigation team, accompanied by representatives of the Kentucky Department of Mines and Minerals (KDMM), company management officials, and Eric Canler, miner operator and witness, proceeded to the accident scene to secure the area and gather additional information and evidence. Members of the investigative team photographed and mapped the area where the accident occurred. An examination of the mine roof was conducted across the working section before leaving to ensure there were no other unsafe conditions present. Roofbolt spacing was measured across the entire section.

The morning of August 21, Roof Control Specialist Terry Cullen and Inspector Felix Caudill went back to the Cardinal mine and inspected the roof conditions on the No. 1 and No. 2 Unit.

At 10:00 a.m., on Thursday, August 21, Accident Investigator Curtis Haile, Solicitor Anne Knauff, Johnny Green and Louis Compton, accident investigators for the Kentucky Department of Mines and Minerals, conducted formal taped interviews of witnesses at the MSHA District 10 Headquarters in Madisonville, Kentucky.

At 11:00 a.m., on August 21, Staff Assistant Smith accompanied MSHA's Pittsburgh Technical Support Representatives Joe Zelanko and Paul Tyrna to the Cardinal mine and examined the accident scene on the No. 2 Unit. The technical support representatives examined the roof conditions on No. 1 and No. 3 Unit before leaving the mine. At 5:56 p.m., on August 21, the 103 (k) Order was modified to allow the operator to relocate the No. 3 unit to a location with more favorable roof conditions.

On August 22, following a site visit and meeting between MSHA, KDMM, and mine management, a revised Roof Control Plan was submitted and approved and the 103(k) Order was terminated.

TRAINING

On Thursday, August 21, 2003, Educational Field Services Representative Leland Payne reviewed the training records and all required training was found to be in compliance.

DISCUSSION

The Cardinal mine extracts coal from the Kentucky No. 11 seam that averages about 65 inches in height. Overburden in the area where the accident occurred averages 584 feet. No mining had been conducted above or below the No. 11 coal seam in the area.

The immediate roof above the Kentucky No. 11 seam is composed of shale, claystone and limestone. A dark gray/black, very brittle, carbonaceous shale and a dark gray, fossiliferous claystone occur in varying thicknesses immediately above the coal seam and are referred to locally as "the gob." The claystone reportedly is present throughout the mine and is usually less than 6 inches thick. The shale unit reportedly is present in limited areas and tends to be thinly to very thinly bedded (up to 2.5 in.). Slickensides are common in the gob (especially in the shale) and are associated with ovate carbonate concretions, undulations in the overlying strata, joints, and faults. The gob is overlain by the Providence Limestone ranging in thickness from 0 to 6 feet in the active sections and forms the main structural unit in terms of roof strength.

The accident occurred on the No. 2 Unit. A seven entry-wide panel was being developed in a north by northwest direction under approximately 545 feet of overburden at the site of the accident. Pillars typically were developed on 53-foot by 75-foot centers using

20-foot (maximum) width entries. Roof support consisted of 48 inch long, No. 5 fully grouted bolts installed with 6-inch by 6-inch (grade 2) domed plates over 8-inch by 18-inch by 1 ¾-inch wood headers. Bolts within rows were installed on 5-foot centers (4 bolts per row), while rows of bolts were spaced 4 feet apart. The wood headers were oriented lengthwise parallel to bolt rows.

The accident occurred near the outby edge of the last open crosscut in the No. 6 entry. At the accident site, mining height was 7 feet and the entry width averaged 19 ½ feet. The slab that struck the victim fell from between bolt rows and extended outward from the left rib to the center of the entry. The rock was approximately 11 feet long, 4 feet wide, and 0 to 3 inches thick and composed of thinly bedded, brittle shale. The fallen material was comprised of several pieces that were estimated to weigh a combined total of 1,600 pounds. The fall cavity was bounded by several steeply angled slickensides and intersected on the inby side by a tight, vertical joint. Bolt spacings adjacent to the fall were within roof control plan specifications.

Roof and rib conditions on the section generally were good. Pillar spalling was typically limited to pillar corners and roof damage was not widespread. Slickensides, bedding planes, and localized cutter roof conditions contributed to instability of the slab at the accident site. The cutter roof damage was present near the roof/rib interface in the form of shallow, stress induced failures along bedding planes. Similar shallow cutter roof damage was observed at inby pillar corners in several other locations on the section.

Test holes in the accident area indicated that at least 6 feet of limestone was present immediately above the gob. The exposed limestone appeared to be medium to dark gray, hard, fine grained and crystalline in the last open crosscut between entries Nos. 4 and 5. The exposed base of the limestone was characterized by roughly circular undulations, generally 1 to 2 feet in diameter and 1 to 6 inches in amplitude, although diameters of up to 4 feet and amplitudes of 16 inches were observed.

Jointing throughout No. 2 Unit was widely spaced (tens of feet apart) and consistently oriented parallel to the face cleat at N40-50°E. Joint planes were generally vertical, slightly undulating and tight where exposed in intact rock. Where dilated, joints were often filled with white, fine grained calcite. Small (2 to 6 ft^2), thin (1 to 3 inches) slabs of the brittle, lower unit of the gob were observed on the floor of entries and crosscuts. These slabs were often partially bounded by slickensides or adjacent to joints. Stress induced failures were observed in the form of subtle cutter failures and shallow potting. Roof damage appeared to occur most frequently at the roof/rib interface near the inby pillar corners.

Faulting was observed roughly 200 feet outby the accident site, where a normal fault was traceable through the section on a bearing of N62°E (dip 50°SE). This fault did not appear to have had any direct influence on the accident.

The victim was helping to relocate the trailing cable for the continuous miner in the No. 6 entry on the No. 2 unit (MMU 002). He was working approximately 54 feet away from

the working face, outby the crosscut to the right of the entry where the continuous mining machine had finished extracting coal.

The roof where the fall of rock occurred had been supported during the second shift on August 19. Preshift and On-Shift examinations of this area failed to detect visible hazardous conditions of the roof and ribs.

ROOT CAUSE

Causal Factor: The standards, policies, and administrative controls in use at the mine were inadequate to identify the hazardous roof condition and did not ensure that the roof was supported or adequately controlled to protect persons from hazards from falls of roof.

Corrective Actions: Through revisions to the approved roof control plan, the spacing of the permanent roof bolts was changed from four feet wide and five feet on center to three and one half feet wide and four and a half feet on center. The size of the wooden headers positioned between the six inch by six inch roof bolt plates and the mine roof was increased from eighteen inches in length to twenty inches in length. Reducing the area between the roofbolt spacing across the entry and between the advancing rows of roof support reduces the likelihood in addition to the size of gob falling from between the permanent roof support. In addition, all underground employees were retrained to improve their recognition of roof conditions which require further actions

CONCLUSION

Unit Foreman William Adams was fatally injured while helping move the trailing cable for the right side continuous mining machine to the opposite side of the No. 6 entry when he was struck by a section of rock falling from between the rows of permanent roof support. The falling material comprised of several pieces that were estimated to weigh a combined total of 1,600 pounds. The fall cavity was bounded by several steeply angled slickensides and intersected on the inby side by a tight, vertical joint. Bolt spacing adjacent to the fall was within roof control plan specifications. The accident occurred because the unsafe roof condition was not identified and redressed.

ENFORCEMENT ACTIONS

The 103 (k) order stated, "The mine has experienced a fatality. The accident occurred on No. 2 unit, (MMU 002) in the last open crosscut of the No. 6 entry. This order is issued to cover the entire underground mine and assure the safety of any person involved with the investigation until an examination is made to determine that the area is safe for work. Mine examinations and maintenance of pumps and equipment necessary to safe operation of the mine is permitted."

A 104 (a) citation for a violation of 30 CFR 75.202(a) was issued, which stated "On August 20, 2003 a fall of roof measuring 11 feet long by 4 feet wide and varying from 0 to 3 inches in thickness occurred on the No. 2 Unit (MMU 002) at the outby rib line of the last open crosscut in the No. 6 entry which resulted in a fatal accident. Persons were working and traveling in this area that was not supported or otherwise controlled to protect miners from related falls of the roof."

Approved By:

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Carl E. Boone II
District Manager

Appendix A

Persons participating in the Investigation

Cardinal

Name	Job Title
Jim Ricketts	Regional Manager
William C. Adelman	General Manager
Paul Love	Safety Assistant
Jeff Hibbs	Safety Assistant
Kevin Vaughn	Director of Training & Safety
Brian Kelly	Company Mining Engineer

Kentucky Department of Mines and Minerals

John Green	Deputy Chief Accident Investigator
Ronnie Drake	West Kentucky District Supervisor
Louis Compton	Accident Investigator
Kenny Mitchell	Accident Investigator

MSHA Investigation Team

Ted Smith	Supervisor Accident Investigation District 10
Curtis W. Haile	Accident Investigator
Abe De Leon Jr.	Compliance Specialist
Terry Cullen	Roof Control Specialist
Joe Zelanko	Technical Support/Roof Control Specialist
Paul Tyrna	Technical Support/Geologist

Appendix B

Persons Interviewed

Name	Job Title
Richard Burden	Unit Helper
Eric Canler	Continuous Miner Operator
William Greenwell	Roof Bolter Operator
Jessie Campbell	Second Shift Mine Foreman
Dennis Walker	Mechanic

Appendix C

PHOTOGRAPHS

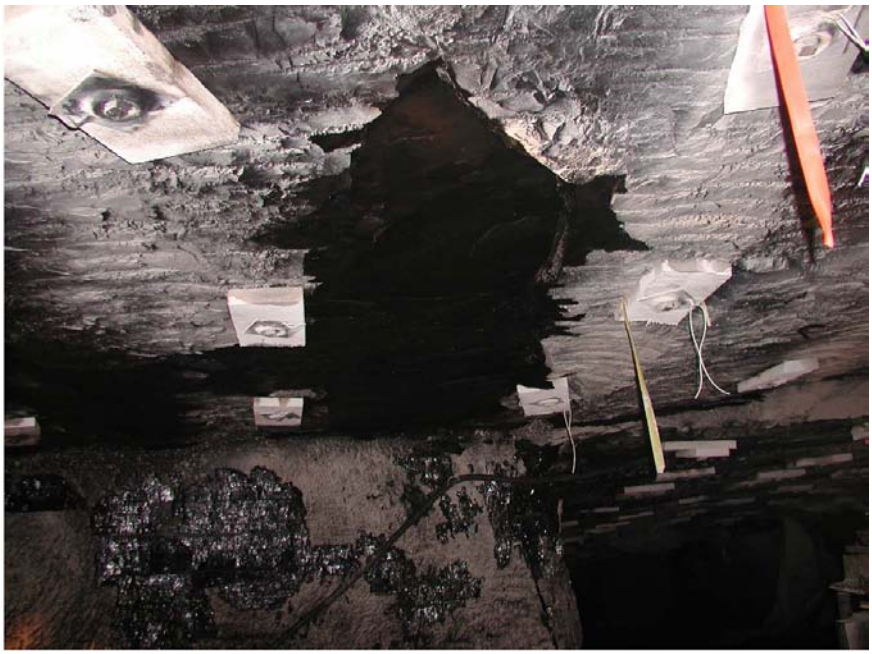

Photo 1: Figure 1 Roof cavity from where the 11'x 4'x 0-3' rock fell.

Photo 2: Position of roof bolting machine and trailing cable outby the working face of the #6 entry in the last open crosscut.